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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/758,565	01/15/2004	Purusottam Sahoo		5904

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EXAMINER

MCNEIL, JENNIFER C

ART UNIT	PAPER NUMBER
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1775

DATE MAILED: 10/18/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

10/758,565

Applicant(s)

SAHOO ET AL

Examiner

Jennifer C. McNeil

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 29 July 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-11 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-11 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Claim Rejections - 35 USC § 102*

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1 and 7 are rejected under 35 U.S.C. 102(a) as being anticipated by Schaeffer et al (US 2003/0027013). Schaeffer teaches a thermal barrier coating comprising a top layer formed of YSZ and containing dense vertical cracks. A layer of alumina is formed over a bond coat of MCrAlY and under the YSZ layer, and is considered a crack arresting layer.

Claims 1-3, and 7 are rejected under 35 U.S.C. 102(e) as being anticipated by Subramanian (US 6,703,137). Subramanian '137 teaches a thermal barrier coating comprising a less dense bottom layer (20) and a more dense top layer (22) with a plurality of segmentation gaps (considered cracks). The bottom layer is considered a crack resistant layer as it is composed of the same material as that of applicant's instant disclosure. Furthermore, regarding claims 2 and 3, the bottom layer comprises

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pores that may be formed by incorporation of polyester into the layer. A bond coat of MCrAlY is formed between the substrate and the thermal barrier coating.

Claims 1, 2, 4, 5, and 7 are rejected under 35 U.S.C. 102(e) as being anticipated by Subramanian (US 6,716,539). Subramanian '539 teaches a thermal barrier coating having a porous first layer and a second relatively dense layer having a plurality of gaps. Both layers comprise ceramic insulating material YSZ. The first layer comprises pores which serve to arrest the propagation of cracks originating at the vertical gaps. Regarding claims 4 and 5, the first (intermediate) layer may be applied in 1-4 passes of 1-5 mils (0.001-0.0005 inches) per pass. In other words, the first layer may have a thickness of 1-20 mils (0.001-0.02 inches). A bond coat of MCrAlY is formed between the substrate and the thermal barrier coating.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Schaeffer et al (US 2003/0027013) in view of Vine et al (US 4,936,745). Schaeffer teaches a thermal barrier coating with a bond coat of MCrAlY but does not give additional examples of bond coatings that may be used. Vine teaches a bond coating for a thermal barrier coating system comprising MCrAlY which

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may include additions of Hf and Si. The bond coat may be applied with a thickness of 5-10 mils (0.005-0.010 inches). As it is taught by Vine that a MCrAlY layer having additions of Hf and Si is readily used as a bond coating for a thermal barrier coating system, one of ordinary skill in the art at the time of the invention would have found it obvious to use a bond coat of this type in the coating of Schaeffer with the full expectation that it would successfully provide adherence of the ceramic coating.

Claims 4 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Subramanian (US 6,703,137) in view of Subramanian (6,716,539). Subramanian '137 teaches a thermal barrier coating having a bottom and top layer as described above, but does not give specific thicknesses for these layers.

Subramanian '539 teaches a thermal barrier coating having a first and second layer similar to that of Subramanian '137 and teaches that the thickness of the first layer may be 1-20 mils and the second layer may be 3-25 mils. It would have been obvious to one of ordinary skill in the art at the time of the invention to apply the coatings of Subramanian '137 with thicknesses similar to that of Subramanian '539 since the layers of Subramanian '539 have a thickness sufficient to provide protection of the underlying substrate.

Claims 6, and 8-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Subramanian (US 6,703,137) in view of Vine et al (US 4,936,745). Subramanian '137 teaches a bond coat of MCrAlY but does not give additional examples of bond coatings that may be used. Vine teaches a bond coating for a thermal barrier coating system comprising MCrAlY which may include

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additions of Hf and Si. The bond coat may be applied with a thickness of 5-10 mils (0.005-0.010 inches). As it is taught by Vine that a MCrAlY layer having additions of Hf and Si is readily used as a bond coating for a thermal barrier coating system, one of ordinary skill in the art at the time of the invention would have found it obvious to use a bond coat of this type in the coating of Subramanian '137 with the full expectation that it would successfully provide adherence of the ceramic coating. Regarding claims 10 and 11, the articles of both Subramanian '137 and '539 are used for turbine engine components.

Claims 6, and 8-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Subramanian (US 6,716,539) in view of Vine et al (US 4,936,745). Subramanian '539 teaches a bond coat of MCrAlY but does not give additional examples of bond coatings that may be used. Vine teaches a bond coating for a thermal barrier coating system comprising MCrAlY which may include additions of Hf and Si. The bond coat may be applied with a thickness of 5-10 mils (0.005-0.010 inches). As it is taught by Vine that a MCrAlY layer having additions of Hf and Si is readily used as a bond coating for a thermal barrier coating system, one of ordinary skill in the art at the time of the invention would have found it obvious to use a bond coat of this type in the coating of Subramanian '539 with the full expectation that it would successfully provide adherence of the ceramic coating. Regarding claims 10 and 11, the articles of both Subramanian '137 and '539 are used for turbine engine components.

Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Subramanian (6,716,539) in view of Subramanian (US 6,703,137). Subramanian '539 teaches a porous bottom

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layer as discussed above, but does not teach how the porosity is provided. Subramanian '137 teaches a porous first (bottom) layer similar to that of Subramanian '539, and further teaches that the porosity is formed by providing polyester in the layer. It would have been obvious to one of ordinary skill in the art at the time of the invention to form the porosity of the bottom layer of Subramanian '539 by using polyester as taught by Subramanian '137, as it is clearly taught to successfully provide porosity in a zirconia layer and adhered to an underlying MCrAlY layer.

### ***Response to Arguments***

Applicant's arguments filed July 29, 2005 have been fully considered but they are not persuasive.

Regarding Schaeffer, applicant argues that the alumina is part of the bond coating itself and does not constitute a coating as claimed in instant claim 1. The alumina layer, however it may be formed, is considered a coating. The manner in which the alumina is formed does not take away from the fact that it is a layer that is formed over another material, and is therefore considered a coating.

Applicant argues that there is no teaching in Schaeffer of the alumina being a crack-arresting layer. The cracks of the overlying YSZ layer do not extend into the alumina layer, and therefore it is considered to meet the function of "crack-resistant".

Regarding Subramanian '137, applicant argues that the top layer gaps are not considered cracks as created in the claimed coating wherein the cracks are randomly spaced, with sub-micron separation created due to stress imposed on the coating. This argument is not considered commensurate in scope with the instant claims, as the manner in which the cracks are formed is not

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claimed, nor is their distribution or size. The manner in which the gap of Subramanian '137 is formed has no bearing on the fact that it is a break in the coating, and is considered a "crack".

Applicant notes that the vertically cracked topcoat of instant claim 1 provides for randomly disposed vertical cracks that are clearly not gaps. The phrase "vertically cracked" does not assign randomness in the distribution of the cracks. Also, a crack in the layer is considered a gap in that the definition of "crack" according to Webster is "a narrow break" or "a narrow opening". Likewise, Webster defines "gap" as a break in a barrier".

Regarding Subramanian '539, applicant argues that the gaps themselves are not cracks. However, applicant also states, and as taught by Subramanian '539, the first layer serves to arrest propagation of cracks originating from gaps in the second layer. Therefore, even if one were to consider the gaps not to be cracks, Subramanian '539 teaches that the porous underlayer (first layer) arrests cracks emanating from these gaps. Therefore the first layer serves as a crack arrestor for the second layer.

Applicant's arguments are not considered persuasive.

### ***Conclusion***

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be



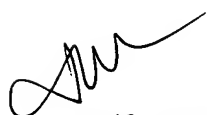
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calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jennifer C. McNeil whose telephone number is 571-272-1540. The examiner can normally be reached on 9AM-6PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Deborah Jones can be reached on 571-272-1535. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Jennifer McNeil  
October 15, 2005